

SOME SLUGS (AGRIOLIMAX) FROM GUATEMALA.

BY T. D. A. COCKERELL.

When my wife went to Guatemala early in 1912, I begged her to look for slugs, which I supposed would be found in abundance. To her surprise and mine, they proved extremely scarce, the only one obtained being two specimens of *Agriolimax*, of the type of *A. laevis*. These may be described as follows:

(1). From Antigua, a locality in the highlands. Pl. II, fig. 3. About 12 mm. long in alcohol; mantle 5 mm. long, the respiratory orifice $3\frac{1}{4}$ mm. from its anterior end; color light brownish suffused with slate grey, the mantle dark slate grey; sides below mantle pallid; sole yellowish white; lateral pedal furrow a little above middle of lateral margin of sole; median area of sole a trifle broader than lateral areas, except posteriorly; shell $2\frac{1}{2}$ mm. long, $1\frac{1}{4}$ broad, narrow, slightly convex, not very thick, the anterior (nuclear) end distinctly emarginate; jaw of the same type as that of *A. laevis*, the median projection very large. Penis sac like that figured for *A. laevis* by Taylor, Monog. L. & F. W. Moll, Brit. Is., part 10, f. 141, with the rounded end curled over, but the whole structure rather more slender, its length a fraction over 2 mm. The lingual membrane of which a beautiful preparation was kindly made for me by Miss Rosamond Patton, shows 31-15-1-15-13 teeth, formed essentially as in *A. laevis* (Taylor, f. 136), except that the central tooth has the mesocone a trifle broader, and the long and slender marginals have no sign of an ectoconal angle. The stomach was full of fragments of leaves, which exhibited cells containing very characteristic crystals, which my colleague Dr. F. Ramaley at once recognized as being exactly like the crystals in leaves of *Begonia*, on which common tropical plant the slug doubtless fed.

(2). From Quirigua, a locality in the tropical lowland jungle. Pl. II, fig. 4. About 10 mm. long in alcohol, of the usual form; mantle 5 mm. long, respiratory orifice 3 mm. from

anterior end; color dark coffee brown, including sole; mantle a shade darker than body; no markings; lateral pedal furrow below middle of sides of sole; median area of sole about as wide as either lateral area. Penis-sac curled like a letter s. Shell $2\frac{1}{2}$ mm. long, a fraction over 1 mm. broad, formed as in the Antigua specimen. Marginal teeth mostly simple, but the inner ones with small side cusps. The stomach contained vegetable remains, including numbers of two-armed hairs, which Dr. Ramaley identifies as being almost certainly those of a leguminous plant.

The character of the penis sac, wholly without any apical branched gland, places both these species in the group of *A. laevis*, and separates them from *A. agrestis*. The jaw also is entirely of the *laevis* type. It is a most extraordinary thing that slugs from the moist tropical coast region of Guatemala, and others from the highlands of that country, apparently native species, should so closely resemble the slug found at high altitudes in the mountains of Colorado, and that common in northern Europe. The fact of the wide distribution of the *laevis* type has long been known, but one remains amazed at such migrations combined with such conservatism!

The same type of slug occurs at high altitudes in Asia. The character of the marginal teeth in the Quirigua slug agrees quite closely with that of *A. tibetanus* Godwin-Austen (Records Indian Museum, II, 1908, p. 414), from an altitude of 14,500 feet. The inner angle of the first laterals (admedians of Godwin-Austen) is less prominent in the Tibet slug, but the drawing is not very detailed. In attempting to distinguish the Guatemalan slugs from veritable *A. laevis*, we are almost at a loss. The total absence of any angle or tooth on the marginals in the Antigua slug appears distinctive, but the far northern *A. laevis hyperboreus* is figured as having just such marginals. The shell in our specimens, except for the narrow form, shows nothing characteristic; it has not the obtusely keeled form of that of *A. berendti* and *A. hemphilli pictus*. The slight differences shown in the figures of the middle and first lateral teeth of the Antigua and Quirigua specimens are apparently of no particular significance, as the

teeth of the different transverse rows are not precisely alike. Both forms, however, show very distinctly the inner angular projection of the first laterals, which is (probably in error?) omitted from Strebel's figures of *A. stenurus* and *A. berendti*, and also from Semper's figure of *A. brasiliensis*. The figures of *stenurus* and *brasiliensis* do indeed show an inner angle, but from its position it is evidently neither an angle or endoconal point. On comparison with *A. guatemalensis* Crosse & Fischer the shell in our slugs is seen to be narrower than the figure in Miss. Sci. Mex. (1878) pl. 9, f. 2; and the lateral teeth have a well-marked endocone, whereas the figure in Miss. Sci. Mex., pl. 9, f. 4, shows none. Much has been made of the inner tooth of the inner laterals, but I suspect that some of the published figures may be faulty, since when the focus is not exactly right it cannot always be seen. Von Ihering's figures of the teeth of *A. brasiliensis* show the inner tooth very well, and differ from Semper's figures of the same species.

It is at present somewhat uncertain whether the Antigua and Quirigua slugs represent different species or subspecies; but since they occupy entirely different life-zones, and present some tangible structural differences, it seems probable that they should be given different names. *A. guatemalensis* is said to be 15-18 mm. long, bluish-black, the mantle darker, the sole pale; central tooth plainly tricuspidate. This might well apply to the Antigua slug, allowing for the usual variation. The teeth of *guatemalensis* were 35-14-1-14-35, which is sufficiently near the formula of the Antigua slug. The locality of *guatemalensis* is Totonicapan, where it was obtained by Bocourt. This, like Antigua, is in the midst of the mountain country, and may be expected to have a similar fauna. All things considered, then, I believe I am justified in calling the Antigua specimen *A. guatemalensis* Crosse & Fischer, 1870. The Quirigua slug, from the tropical lowlands of the Motagua Valley, may for the present be known as *A. guatemalensis motaguensis* n. subsp.

I will take the opportunity to note that Taylor (*op. cit.*, p. 126) is surely in error when he refers my *A. lavis maculatus* to *A. lavis lacustris* (Bonelli). The marginal teeth of

lacustris, as well figured by Lessona and Pollonera, are very unlike those of *A. lacvis*, and appear to indicate a distinct species, as the Italian authors maintained.

HENRY HEMPHILL.

We have just received notice of the death, July 25, at Oakland, Cal., of Henry Hemphill, in his eighty-fifth year. Mr. Hemphill was born in Wilmington, Del., in 1830, but for many years had been a resident of the state of California. He was a mason by trade and took great pride in his proficiency. More than fifty years ago he became interested in the shells of the Pacific coast and formed one of a group of enthusiastic collectors which included Kellogg the botanist, Harford, Voy, Stearns and others, of which he was the last survivor. His trade brought him in, at California union wages, such a good income that he could not only lay away a fair nest egg for his old age, but take long vacations. During these periods he visited Florida and all parts of the Pacific coast south of British Columbia, and became one of our most expert collectors of mollusks. The genus of slugs, *Hemphillia*, was named in his honor by the late W. G. Binney, and a host of species commemorate in like manner his success as a collector.

He published but few papers himself, but was the cause indirectly of much publication by others. He had a keen eye for relationships and differences, and at times mounted on large tablets series of land shells with radiating lines of variation which were most instructive, and which found a place in some of the most important museums. He had been long a widower, and, as age diminished his energies, he retired to Oakland, where for the last few years he made his home with an only daughter. His kindly ways and generosity to others will keep his memory green among those who knew him. He left what is doubtless the best and most complete collection of Pacific coast shells, up to the time of his retirement, that is to be found anywhere except in the National Museum. It is particularly rich in series showing